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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,382	10/16/2003	Roy Zeighami	10014777-3	2132
22879	7590	04/26/2004	EXAMINER	
HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400			DATSKOVSKIY, MICHAEL V	
			ART UNIT	PAPER NUMBER
			2835	

DATE MAILED: 04/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

10/687,382

Applicant(s)

ZEIGHAMI ET AL.

Examin r

Michael V Datskovskiy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear why claim 6 claims a step of utilizing gravity to force fluid to the condenser. As examiner understands it, fluid vaporizes in micro-channels, rises as a vapor under some pressure to the condenser, and then in a liquid form goes down back in the micro-channels under gravity force.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-6 (claim 6 as understood by the examiner) are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuckerman et al in view of Kuwabara et al. Tuckerman et al teach a method and means for heat removal from a semiconductor die 60, Figs.1-3 and 7-8, comprising the steps of flowing fluid through micro-channels defined by fins 61 formed into the die 60 and shaped for flowing the fluid along the micro-channels; communicating fluid from the die to and from a condenser utilizing

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gravity forces to force the fluid to the condenser (col. 4, lines 56-59), wherein said micro-channels 61 are bounded in part by a semiconductor element-glass plate 69 coupled with the die 60, and said means utilize headers 62 coupled with the micro-channels of the die 60. Tuckerman et al do not teach said means including a condenser arranged above the die. Kuwabara et al teach a method and means for heat removal from a semiconductor die 12, Figs.1-14, comprising the steps of flowing fluid through micro-channels defined by grooves 26 formed on a boiling surface 27 by plates 20, and communicating fluid from the boiling surface 27 to and from a condenser 10 arranged above said die 12, and utilizing gravity forces to force the fluid from the condenser 10. It would have been obvious to one skilled in the art at the time invention was made to arranged a condenser above a die, as it is shown by Kuwabara et al in the device by Tuckerman et al in order to make the device more compact. Examiner directs applicant's attention to the pertinent prior art references by Buyanov et al, Nelson et al and Newton et al, each teaching a two-phase coolant cooling system for a die, said systems each including a condenser arranged above said die.


5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nelson et al (US Patent 6,529,377); Newton et al (US Patent 6,437,981) ; Vafai et al (US Patent 6,457,515) ; Jun et al (US Patent 6,582,987) ; Bezama et al (US Patent 5,870,823) ; Hamburgien et al (US Patent 5,203,401); Weber (US Patent 5,057,908); Dusablon et al (US Patent 5,508,234); Bevan et al (US Patent 5,795,788); Levine et al (US Patent 6,031,286) and Buyanov et al (SU 1781735 A1).

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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V Datskovskiy whose telephone number is (571) 272-2040. The examiner can normally be reached on 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on ((571) 272-2044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


04/20/04

Michael V Datskovskiy
Primary Examiner
Art Unit 2835